

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of:

Thomas Richard Vitton

Serial No.: 10/579,240

Filed: July 10, 2006

For: EXAMINATION CHAIR

Attorney Docket No.: GPIA 0101 PUSA

Group Art Unit: 3736

Examiner: John Pani

DECLARATION OF ERIK VIIRRE
UNDER 37 C.F.R. § 1.132

Mail Stop Amendment
Commissioner for Patents
U.S. Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

I, **Erik Viirre M.D. Ph.D. 3015 Driscoll Dr. San Diego,**
California, 92117, hereby declare as follows:

1. My relevant background is here extracted from my
curriculum vitae:

CURRICULUM VITAE
(revised December, 2010)

ERIK SCOTT VIIRRE
3015 Driscoll Dr.
San Diego, California, 92117
eviirre@ucsd.edu

PERSONAL INFORMATION

Date of Birth: November 13, 1961

Place of Birth: Toronto, Ontario, Canada.

Citizenship: Canada and United States
Marital Status: Married, two children.

CLINICAL AND RESEARCH INTERESTS

As a physician, my clinical interests include management of patients with tinnitus, vertigo and hearing loss, a specialty referred to as Neurotology. My clinical practice is at the University of California, San Diego Medical Center where I carry out consultations and medical management of these disorders. I also train medical students, audiology students, clinical house-staff and fellows from the UCSD School of Medicine on these topics.

As a biomedical researcher and neurophysiologist, my interests include investigations of the origin and management of vertigo and tinnitus. I have been developing techniques of combining visual displays or sound techniques for these problems. I also carry out clinical trials on medical assessment and treatment of neuro-otologic disorders such as Benign Positional Vertigo and Migraine.

I am also interested in development of systems to assess cognitive state during human computer interactions. I have collaborations with cognitive scientists and engineers for this work. I am working on systems that can indirectly and directly assess neural states, on means of advanced analysis of neural state data and on human-computer applications where neural state information can be used.

ACADEMIC PROGRAM

- 2006: Presentations for Technical Professionals, UCSD Extension
- 2005: Course on Advanced Electroencephalography Data collection and Interpretation, UCSD Cognitive Science Swartz Center
Course on Intermediate Statistical Analysis, UCSD Extension.
- 2004: Course on Tinnitus Retraining Therapy for Management of Tinnitus and Hyperacusis, Towson U.
- 1994-5: Visiting Assistant Professor, Department of Neurology, UCLA School of Medicine, Los Angeles, California. and Visiting Assistant Professor, Jules Stein Eye Institute, Department of Ophthalmology, UCLA School of Medicine, Los Angeles, California.
- 1992-4: Neurotology clinics and research at London Ear Clinic with Dr. Joseph McClure (Department Otolaryngology, University of Western Ontario).
- 1991: Optics Course: Practical Lens Design. Genesee Inc.
- 1990-4: Part-time fellowship in Department of Imaging Research, Robarts Research Institute, University of Western Ontario (U.W.O.), London, Canada.
- 1989: Faculty Assistant, International Space University.
- 1988-9: Internship at St. Joseph's Health Centre, London Ontario, Canada.
- 1988: Graduate Student in the Human Performance in Space Section of International Space University, held at Massachusetts Institute of Technology. June 20 to August 20.
- 1988: M.D. awarded.
- 1987: Ph.D. (Physiology) awarded. First time in U.W.O. history that a Ph.D. was the first degree awarded.
- 1985: Admitted to M.D.-Ph.D. program in Physiology, U.W.O.
- 1983: Admitted to M.D. program at U.W.O.
- 1980-3: Undergraduate Program in Physiology and Psychology at U.W.O.

PROFESSIONAL PROGRAM:

- 2010: 1.) Adjunct Professor, (Step I), Department of Neurosciences, UCSD School of Medicine
- 2009: 1.) Associate Adjunct Professor, (Step III), Department of Neurosciences, UCSD School of Medicine
2.) Faculty Member and Project Adjudicator at Singularity University, July-August 2009,

- NASA Ames Research Center. Section: Medicine: Neuroscience, Human Enhancement
- 2008: 1.) Promoted to Associate Adjunct Professor, (Step III), UCSD School of Medicine
- 2006: 1.) Promoted to Associate Adjunct Professor, (Step II), UCSD School of Medicine
- 2004: 1.) Promoted to Associate Adjunct Professor, UCSD School of Medicine and Associate Research Professor, UCSD Department of Cognitive Science.
2.) Intergovernmental Personnel Agreement placement with Naval Health Research Center, San Diego.
3.) Director of the Applied Cognitive Science Laboratory, Naval Health Research Center, San Diego
- 2003: 1.) Appointed Member of UCSD Whittaker Institute of Bioengineering.
2.) Member of Joint SDSU/UCSD Doctorate of Audiology Faculty.
- 2002: 1.) Appointed Senior Research Scientist, Cognitive Performance Laboratory, Naval Health Research Center, San Diego.
2.) Appointed Scientific Board Member, BioMed IRB (4/25/2001)
3.) Cofounder and Scientific Advisor, Otosonics Inc.
- 2001: 1.) Appointment as Research Assistant Professor to UCSD Department of Cognitive Science approved by Cognitive Science Faculty.
2.) Appointed Medical Director, Balance Centers of America, Vestibular Rehabilitation Clinic.
3.) Appointed Medical Reviewer, Biomed IRB, San Diego CA. Independent Review Board for medical research.
4.) Appointed to Assistant Adjunct Professor, Step III, UCSD School of Medicine
- 2000: 1.) Promoted to Assistant Adjunct Professor, Step II, UCSD School of Medicine.
2.) Appointed Research Associate, Center for Neurologic Study, La Jolla, California
3.) President Sapien Systems. La Jolla CA. Human Interface Technology Company
- 1999: 1.) Appointed Adjunct Assistant Professor, UCSD School of Medicine, Division of Otolaryngology
2.) Research Scientist affiliation with Human Interface Technology Laboratory, University of Washington, Seattle WA.
- 1998: 1.) Appointed Clinical Instructor in the UCSD School of Medicine, Division of Otolaryngology, for patients with vertigo, balance disorders and tinnitus.
2.) Researcher with Dr. Helene Hoffman on Office of Naval Research Project "3D Perception Metrics for VE-based Training Systems". Design and completion of pilot data convergence eye movements during viewing of 3D environments.
3.) Principal Investigator on UCSD research project "Vestibular Rehabilitation using Visual Displays: Pilot Project. An investigation of the use of virtual reality to improve balance function in patients with vestibular disorders. NIH R03 grant submitted and awarded for further research, starting 1/99.
- 1996: 1.) Research Scientist at Human Interface Technology Laboratory: Situation awareness in Virtual Environments, funded by Air Force Office of Scientific Res., investigation of simulator sickness in VR.
2.) Principal Investigator at Human Interface Technology Laboratory: Vestibular telemedicine Project, in collaboration with Madigan Army Medical Center and Seattle Veterans Administration Hospital, development of technology and protocols to deliver consultations via video technology.
- 1995: 1.) Research Scientist at Human Interface Technology Laboratory: Virtual Retinal Display, Vision tests and Low Vision application development of display technology. Supervision of Ph.D. candidate Homer Pryor.
- 1990-1994: 1.) Private medical practitioner in London, Canada. Operated medical practice for delivery of primary eye care.
2.) Emergency Medical Care: Served as medical staff in emergency rooms at Strathroy

District Hospital, Woodstock General Hospital and Sydenham District Hospital in Ontario,
Canada.

RESEARCH GRANTS

- 2009: 1.) Principal Investigator: Mobile EEG and Situation Awareness, Office of Naval Research,
\$440,000
- 2009: 1.) Principal Investigator: Mobile EEG and Situation Awareness, Office of Naval Research,
\$440,000
- 2008: 1.) Principal Investigator: Unrestricted Education Grant, Neuromuscular Technologies, \$25,000
- 2007: 1.) Principal Investigator: Neural Markers of PTSD and Blast, Office of Naval Research, \$190,000
2.) Principal Investigator: Physiologic Markers of Combat Stress Disorders, Office of Naval
Research, \$140,000
3.) Principal Investigator: Oculography Technology Assessment, EyeCom Inc. \$43,000
- 2006: 1.) Principal Investigator: Neural Markers of Spatial Disorientation, Office of Naval Research,
\$135,000
2.) Principal Investigator: Neural Markers of PTSD and Blast, Office of Naval Research, \$135,000
3.) Principal Investigator: Physiologic Markers of Combat Stress Disorders, Office of Naval
Research, \$90,000
- 2005: 1.) Principal Investigator: Neural Markers of Disordered Motion Senses, Office of Naval Research.
\$190,000
2.) Principal Investigator: Nervous System Changes as Indicators of Nuclear, Chemical or Biological
(NBC) Exposures, NHRC Laboratory Core Funding, \$142,000
- 2004: 1.) Principal Investigator: Applied Cognitive Science Laboratory, U.S. Navy Bureau of Medicine.
\$865,000
2.) Principal Investigator: Development of Physiologic Indices of Disordered Motion Sense: Pilot
Study. DARPA \$18,000
- 2003: 1.) Principal Investigator: Daimler Chrysler Corporation Grant: Advanced Analysis of Eye
Movement Data. \$39,000

- 2.) Co-Investigator Von Leibig Award, UCSD School of Engineering: Real -time Volumetric Imaging of Neural Activity, \$50,000
- 2002: 1.) Co-Investigator: Naval Research Center Project: Measure and characterization of neuro- and psychophysiological indices of cognitive state. Total Costs: \$570,000
- 2.) Principal Investigator: NASA Research Project: Head Mounted Displays and Display Applications for ExtraVehicular Activity and IntraVehicular Activity: Preliminary Research. Total Costs: \$61,000
- 2001: 1.) Principal Investigator: Research Project for Center for Neurologic Study for Biogen Inc. Title: Cognitive Function in Multiple Sclerosis, A Method of Assessment of Disease Progression." Total costs: \$135,000
- 2.) Principal Investigator: Technology Development Project for Sapien Systems Inc. funded by DARPA Title: "Supervisory Interfaces for Autonomous Robots" Total costs: \$196,000
- 3.) Independent Consultant Project for SPAWAR Systems Center, US Navy, San Diego. Title: "Support for development/Integration for HMD and Eyetracking. Total Costs: \$39,990
- 2000: 1.) Co-Investigator. Awarded Grant from Tinnitus Research Consortium. Title: Use of SSRIs in the Treatment of Tinnitus. 6/1/2000 to 5/31/2003. Total Direct Costs: \$300,000.
- 2.) Principal Investigator, Research Project with Center for Neurologic Study, La Jolla CA. Title: "Effects of Reduced NADH (Enada) on Jetlag". Menuco Corporation, NY NY. Costs \$110,000
- 1999: 1.) Principal Investigator. Awarded NIH RO3 grant. Agency: NIDCD Title: Incremental Adaptation of the VOR to Maximize gain changes Grant Number: 1 R03DC03507-01A2 Dates of Award: 2/1/99-1/31/01. Total Direct Costs: 70,000
- 2.) Principal Investigator, Research Project with Center for Neurologic Study, La Jolla CA, A placebo controlled, double-blind comparison of the effects of gatifloxacin and trovafloxacin on vestibular function. 1/1/99 to 7/15/99. Total costs \$256,000 Bristol Myers Squibb.
- 3.) Co-investigator on DARPA Project "Cog-Int", Project Principal Investigator Dr. Annette Sobel, Sandia National Laboratories, Albuquerque, N.M. Project costs \$25,000 7/1/99-6/30/99.
- 4.) Co-Investigator Grant #9978566 National Science Foundation, Division of Information and Intelligent Systems. Title "Use of Virtual Retinal Display in People with Low Vision. \$300,000.
- 1997: Co-Investigator and Author of National Science Foundation grant 9703598 "Optimization of Images from a Scanned Light Display", an investigation of improving image resolution, contrast and color for the Virtual Retinal Display. Total Direct Costs: \$300,000
- 1996: 1.) Principal Investigator at Human Interface Technology Laboratory: VR-Vestibular project, funded by Washington Technology Center, development of technology for investigation of vestibular-oculomotor changes and motion sickness in users of virtual environments. Supervision of Ph.D. candidate Mark Draper. Total Costs: \$24,000.
- 2.) Principal Investigator at Virtual i-O!: Grant # 1 R41 NS35152-01, National Institutes of Health, investigation of use of eye movement detection technology in combination with a head mounted display for use by the disabled Total Costs \$100,000.

3.) Principal Investigator at Virtual i-O!: SBIR , approved for award by the Office of the Secretary of Defense, a project to determine if gravity stabilization of visual images in a head mounted display will reduce sea sickness in computer users on ships Total Costs \$100,000.

HONOURS AND AWARDS

- 2009 Invited Guest Editorial, European Journal of Neurology, "Migraine Related Vertigo- A Common and Important Disorder"
- 2006 Augmented Cognition International Society Ambassadorship Award
- 1996 Invited by the Institute of Electrical and Electronics Engineers, Engineering in Medicine and Biology section to propose a textbook on "Medicine and Virtual Reality"
- 1995 Travel Fellowship, Three Dimensional Kinematic Principles of Eye Head and Limb Movements in Health and Disease. Meeting, University of Tuebingen, Germany.
- 1995 Travel Fellowship, New York Academy of Sciences Meeting: New Directions in Vestibular Research. Rockefeller University, New York, New York.
- 1994-5: Fellowship Funding through Charles Feldman Professorship Fund, Jules Stein Eye Institute, University of California, Los Angeles.
- 1994: McLaughlin Foundation Award.
- 1992: Canadian Astronaut Program: Semi-finalist Candidate
- 1988: Full Scholarship to the Inaugural session of International Space University.
- 1988: Ames Associate At NASA Ames Research Center.
- 1985-7: Medical Research Council Studentship: full funding for graduate study in the Department of Physiology.
- 1984: Medical Research Council Summer Studentship Award.
- 1983: National Sciences and Engineering Research Council Summer Studentship Award.
- 1982: Highest Standing in Undergraduate Physiology and Psychology Program, U.W.O.
- 1981: University of Western Ontario Continuing Scholarship
- 1980: University of Western Ontario. Admission Scholarship

RELATED EXPERIENCE

- 2009: Mentor: Dr Irina Strigo. UCSD National Center of Leadership in Academic Medicine
Project Collaborator: Dr. Ruey-Song Huang UCSD Swartz Center for Computational Neurobiology on Spatial Disorientation Project through USN NHRC
Supervisor of Caton Harris, UCSD AUD student
Ad Hoc committee member for Institute of Medicine and Engineering, 2009
UCSD Medical Center, Clinical Resources Management Committee Member
UCSD Neurosciences PhD Student Project Committee Reviewer: Jeffrey Moore
Project Scientist on Speech Detection with EEG Project with SDSI, USD
Caltech MIT Entrepreneur Forum Speaker: Neurons on the Run
National Space Biomedical Research Institute Panel Reviewer
- 2009: Mentor: Dr Irina Strigo. UCSD National Center of Leadership in Academic Medicine
Project Collaborator: Dr. Ruey-Song Huang UCSD Swartz Center for Computational Neurobiology on Spatial Disorientation Project through USN NHRC
Supervisor of Caton Harris, UCSD AUD student
Ad Hoc committee member for Institute of Medicine and Engineering, 2009
UCSD Medical Center, Clinical Resources Management Committee Member
UCSD Neurosciences PhD Student Project Committee Reviewer: Jeffrey Moore
Project Scientist on Speech Detection with EEG Project with SDSI, USD
Caltech MIT Entrepreneur Forum Speaker: Neurons on the Run
National Space Biomedical Research Institute Panel Reviewer
- 2008: Reviewer of UCSD AUD Student Shannon Lees
Ad hoc reviewer for Journal of Vestibular Research
- 2007: Host: EyeCom Users Workshop Naval Health Research Center, San Diego, CA

- Associate Editor: International Tinnitus Journal
Supervision of Neurotology Fellow, Dr. Ji Hyun Park, Neurologist 2007-8
Review and acceptance of donation of Multi-axis Rotation Chair for Vestibular Research
Medical Consultant: Zero G Corporation, Medical team for Stephen Hawking Flight 4/26/07
Advisory Board for Center for Neurotechnology Studies, Potomac Research Institute
Reviewer for Journal of Vestibular Research (2)
Reviewer for Aviation, Space and Environmental Medicine
Reviewer for Cyberpsychology and Behavior
- 2006: Participant: UCSD Medical Device Affinity Group
Panel Host: Workshop on Neurotechnology for Potomac Institute for Policy Studies held at UCSD CALIT2, La Jolla CA
Medical Consultant: Virgin Galactic Corporation
AuD Student project supervision
Review panel for Vesticon Inc. Portland OR.
Co-Investigator VS Ramachandran Phantom Limb Caloric Project
Reviewer for Journal of Vestibular Research
- 2005: Panel Presentation: Improving Mathematical Ability, DARPA Defense Sciences Office
Reviewer for ORL
Reviewer for Neuroscience Letters
- 2004: Medical Consultant: Zero Gravity Corporation
Reviewer for Journal of Vestibular Research
Reviewer for Aviation Space and Environmental Medicine (x3)
- 2003: Project Originator, "Cognitive Engineering" National Academy of Sciences
Reviewer for Journal of Vestibular Research
Reviewer for Aviation Space and Environmental Medicine (x2)
Invited Participant, Institute of Medicine, Board on Neuroscience and Behavioral Health Meeting
Invited Participant Aerospace Medicine Society Meeting Panel
Invited Participant San Diego Human Factors Society Meeting
Invited Participant SDSU Panel
Invited Participant Army RO meeting
Attendee, Association for Research in Otolaryngology Annual Meeting
Invited Participant Cybertherapy Panel
Invited Participant International Tinnitus Association Panel, San Diego
US Department of Veterans Affairs Scientific Merit Review Board for Rehabilitative Research and Development (until 2005)
- 2002: Reviewer for Otology/Neurotology Forum
Reviewer for Aviation Space and Environmental Medicine
Reviewer for Psychosomatic Medicine
Medical Advisor for Zero G Corporation, 2002-
Chairman for Independent Study Project, Completed 5/02 by UCSD Medical School Student Robert Zalewski-Zaragosa: "Visual Displays for Vestibular Rehabilitation"
Attended DARPA MARS workshop 3/02 Los Angeles CA. Also DARPA Synergistic Cyber forces workshops : San Luis Obispo 10/01 and Tampa 11/01.
Attended American Academy of Otolaryngology meeting Denver, 9/01
Attended and chaired UCSD Neurotology rounds through Academic Year.
- 2001: Appointed to National Academy of Sciences Panel: Advanced Biomaterials as Medical Reviewer
Reviewer for Journal of Psychosomatic Medicine (Until 2002)

Chairman for Independent Study Project, Completed 5/01 by UCSD Medical School Student Matt Miles: "Quality of Life in Migraine-related Vertigo Patients and Evaluation of Short-term Management"

- 2000: Panel Member, NIDCD Panel on Implications of Vestibular Disorders on Driving Ability
Committee Member: Office of Naval Research, Motion Sciences Committee
Member NASA Johnson Space Center, Neurology IPT group. Review of Neurological effects of space flight. (Ongoing)
Reviewer for American Journal of Otolaryngology.
Supervisor for UCSD Medical Student Independent Study Projects for Students Matt Miles and Robert Zaragosa.
UCSD Division of Otolaryngology, Resident Lecturer.
- 1999: Support Group Co-Director for Patients with Dizziness in San Diego County.
Reviewer: Aviation Space and Environmental Medicine Journal.
Participant: Bioengineering Consortium, National Institutes of Health Meeting
Review Panel Member, NIMH, SBIR group
Review Panel Member, NIH NINDS Intramural Section
FDA New Technologies workshop participant
- 1998: Associate of Center for Neurologic Study, La Jolla, California.
Consultant, Vista Medical Technology, Carlsbad, California
Consultant, Physical Optics Corporation, Torrance, California
Participant: Bioengineering Consortium, National Institutes of Health Meeting
- 1997: Served as a reviewer for "Association of Computing Machinery"
Participant: NSF Grantees Workshop, Portland, Oregon
- 1996: Served as a reviewer for "Aviation, Space and Environmental Medicine"
Faculty Member, International Space University Summer Session, Vienna, Austria: Faculty on design project to deliver medical care for long duration space flight.
- 1995: Served as a reviewer for the Journal "Presence" and member of NIH Study panel.
- 1995: UCLA Department of Neurology, Advisor Dr. Charles Markham: Examination of torsional eye movements during static tilts.
- 1994-5: Visiting Assistant Professor at UCLA department of Neurology; Supervisor Dr. R.W. Baloh
Clinical research in Neurotology and Visiting Assistant Professor, Jules Stein Eye Institute, UCLA School of Medicine; Supervisor Dr. Joseph L. Demer.
- 1994: Functional imaging of the extraocular muscles. Robarts Research Institute
- 1992: Description of changes in Benign Positional Vertigo in clinical patients treated with Particle Repositioning Maneuver. Dr. Joseph McClure, London, Canada
1990-2: Development of methods of MRI imaging of extraocular muscles during eye movements in Imaging Group, Robarts Research Institute.
- 1989: Served as a Faculty assistant at International Space University on the "VGRF" design project- a study of a spacecraft that would be used to study artificial gravity and its physiologic effects.
- 1988: Served as a reviewer for the Journal "Biological Psychiatry".
- 1988: Independent study in the Department of Diagnostic Imaging at University Hospital London, Canada. The extraocular muscle position and anatomy in the Human and Macaque monkey were examined with Magnetic Resonance Imaging.
- 1987: Medical School Elective at the Smith-Kettlewell Institute for Visual Sciences. As a Jampolsky Fellow a study was done under Dr. A. Scott on the physiologic basis for variability in response to Botulinum Toxin treatment for Strabismus.
- 1985: Program of Graduate study in the U.W.O. Department of Physiology under Dr. T. Vilis. The dissertation subject was the independent control of the eyes during saccades and the VOR. Demonstration of independent movement control of eyes.

- 1984: U.W.O. Medical School Summer Research Program. In the department of Neurosurgery at University Hospital, London Canada a study was started under Doctor J. P. Girvin. The possibility of using stimulating microelectrodes for a functional visual prosthesis was explored.
- 1982: Research in the U.W.O. Department of Psychology under Dr. D.P. Cain studying on the effects of In utero exposure to ethanol on seizure susceptibility using the method of neural kindling.

PUBLICATIONS

- (1) Viirre E., Cain D.P. and Ossenkopp K.-P. (1986) Prenatal ethanol exposure alters rat brain morphology but does not affect amygdaloid kindling. Neurobehav. Toxicol. Teratol. 8:615-620.
- (2) Viirre E., Tweed D., Milner K. and Vilis T. (1986) A Re-examination of the gain of the vestibulo-ocular reflex. J. Neurophysiol. 56:439-450.
- (3) Viirre E., Cadera W. and Vilis T. (1987) The pattern of changes produced in the saccadic system and vestibulo-ocular reflex by visually patching one eye. J. Neurophysiol. 57: 92-103.
- (4) Viirre E. (1987) Independent control of the two eyes during saccades and the vestibulo-ocular reflex. Ph.D. Dissertation for Department of Physiology, University of Western Ontario.
- (5) Viirre E., Cadera W. and Vilis T. (1988) Monocular Adaptation of the Saccadic system and Vestibulo-ocular reflex. Invest. Oph. Vis. Sci. 29:1339-1347.
- (6) Strong et. al. (1989) The International Space University: a Canadian Perspective. Canadian Aeronautics and Space Journal. 35:44-47.
- (7) Viirre E. Schmidt E. and Cain D.P. (1991) Afterdischarge thresholds in activated iridium stimulating microelectrodes. Report to University of Western Ontario Psychology Department.
- (8) Cadera, W, Viirre E. and Karlik S. (1992) Cine Magnetic Resonance Imaging of Ocular Motility. J. Ped. Ophthalmology and Strabismus. 29: 120-122.
- (9) Cadera W., Karlik S., Viirre E., and Bloom J. (1994) Ocular Pursuit Movement Assessment by Magnetic Resonance Imaging. J. Ped. Ophthalmology & Strabismus. 31: 265-266.
- (10) Viirre E.S. and Baloh R. (1996) Migraine as a Cause of Sudden Hearing Loss. Headache. 36: 24-28.
- (11) Demer, J.L. and Viirre, E.S. (1996) Visual-vestibular interaction during standing, walking, and running. J. Vestibular Res. 6: 295-313.
- (12) Viirre, E.S. and Demer, J.L. (1996) The human vertical vestibulo-ocular reflex during combined linear and angular acceleration with near target fixation. Exp. Brain Res. 112:313-324
- (13) Crane, B.T., Viirre, E.S., and Demer, J.L. (1997) The human horizontal vestibulo-ocular reflex during combined linear and angular acceleration. Exp. Brain Res. 114:304-320
- (14) Viirre, E. S., and Demer, J. L. The vestibulo-ocular reflex (VOR) during horizontal axis eccentric rotation and near target fixation. (1996) Annals of the New York Academy of Sciences 781: 706-708.
- (15) Viirre E. Virtual Reality and the Vestibular Apparatus. (1996) IEEE Engineering in Medicine and Biology. 15:41-43.

- (16) Viirre E.S., Warner D., Balch D. and Nelson J. (1997) Remote Medical Consultation for Vestibular Disorders: Technological Solutions and Case Report. Telemed. J. 3: 53-58.
- (17) Viirre E.S., Johnston R.J., Pryor H.L. and Nagata S. (1997) Laser Safety Analysis of a Scanned Light Display. J. Laser Apps. 9:253-260.
- (18) Viirre E.S. (1997) Health and Safety Issues for VR. Comm. Assoc. Computing Machinery 40:40-41.
- (19) Viirre E.S., Draper M.H., Gailey, C. Miller, D.L. and Furness T.A. (1998) Adaptation of the VOR in patients with Low VOR Gains. J. Vestibular Research. 8:331-4.
- (20) Gross, E.M., Ress B. Viirre E. Nelson J. and Harris J.P (2000) Intractable benign paroxysmal positional vertigo in patients with Meniere's disease. Laryngoscope, 110(4): p. 655-9.
- (21) Draper, M.H., Viirre, E.S. Furness, T.A. and Gawron, V.J. (2001) The effects of Virtual Image Scale and System Time Delay On Simulator Sickness within Head Coupled Virtual Environments. Human Factors 43 (1): 129-146.
- (22) Viirre E.S. and Sitarz R. (2002) Vestibular Rehabilitation Using Visual Displays: Laryngoscope 112(3):500-503.
- (23) Kleweno C.P. Seibel E., Viirre E.S. et. al. (2001) The virtual retinal display as a low-vision computer interface: a pilot study. J. Rehabil. Res. Dev. 38 (4) 431-442.
- (24) Kelly J.P. Turner S., Pryor H.L. Viirre E.S. and Furness T. (2001) Vision with a laser scanning display: comparison of flicker sensitivity to a CRT. Displays 22(5) 169-175.
- (25) Kadner A. Viirre E. et. al. (2002) Lateral Inhibition in the Auditory Cortex: an EEG Index of Tinnitus? Neuroreport. 2002 13 (4): 443-6
- (26) Zalewski-Zaragosa R.A. and Viirre E.S. (2003) Quantitative Measurement of Vertigo frequency: Preliminary Results. J Vestib. Res. 13:53-6
- (27) Viirre E.S. and Ellisman M. (2003) Vertigo in Virtual Reality with Haptics: Case Report. Cyberpsychology and Behavior 6: 429-431
- (28) Robinson, S.K., McQuaid, J.R., Viirre, E.S., Betzig, L.L., Miller D.M., Bailey, K.A., Harris, J.P., Perry, W. (2003). Relationship of tinnitus questionnaires to depressive symptoms, quality of life, and internal focus, Int Tinnitus J. 9:97-103.
- (29) Viirre E, Van Orden K., Wing S., Chase B., Pribe C., Taliwal V., and Kwak, J. (2004) Eye Movements during Visual and Auditory Task Performance. Society of Information Display, Digest of Technical Papers. 35:1582-5
- (30) Chase B, Viirre E, Kwak J, Wing S and Van Orden K (2004) Eye Movement Measures of Performance on a Visual Search Task: Equating the Baselines of Task Performance, Proceedings of Society for Human Factors 18th Meeting: 1855-9
- (31) Park G, Rosenthal T, Allen W, Cook M, Fiorentino D, Viirre E. (2004) Simulator Sickness Results Obtained During a Novice Driver Training Study Proceedings of Society for Human Factors

18th Meeting: 2652-6

- (32) Viirre E.S., Purcell I. and Baloh. R.W. (2005) How I Do It. The Dix-Hallpike Test and The Canalith Repositioning Maneuver. *Laryngoscope*. 115(1):184-7
- (33) Viirre E, Chase B. and Tsai Y-F, (2005) Cognitive performance baseline measurement and eye movement performance measures. *Proceedings of the SPIE Vol 5797* p 48-55
- (34) Strychacz, C, Viirre E and Wing, S (2005) The use of EEG to measure cerebral changes during computer-based motion sickness-inducing tasks. *Proceedings of the SPIE Vol 5797* p 139-147
- (35) Gopen Q., Viirre E. and Anderson J. (2005) Epidemiologic Review to Explore Links between Menière's Syndrome and Migraine. *Proceedings of House Institute Conference on Meniere's Syndrome*
- (36) Viirre E., and Draper M. (2005) Aftereffects on the Vestibular System from Virtual Reality Exposure. *Proceedings of the 11th Human Computer Interaction Conference, Volume 9 - Advances in Virtual Environments Technology: Musings on Design, Evaluation, & Applications*
- (37) Chase, E, Viirre E. and Tsai Y. (2005) Eye Activity Measures of Cognitive Workload: Equating the Baselines of Task Performance *Proceedings of the 11th Human Computer Interaction Conference, Volume 9 - Advances in Virtual Environments Technology: Musings on Design, Evaluation, & Applications*
- (38) Viirre E. and Jung T-P (2005) Augmented Higher Cognition: Enhancing Speech Recognition Through Neural Activity Measures. *Proceedings of the 11th Human Computer Interaction Conference, Volume 11 - Foundations of Augmented Cognition*
- (39) Robinson, S.K., Viirre E.S., Bailey, A.K., Gerke, M.A. Harris. J.P. and Stein M.B. (2005) Randomized Placebo Controlled Trial of an SSRI in the Treatment of Non-depressed Tinnitus Subjects. *Psychosom Med*. 2005 Nov-Dec;67 (6):981-8
- (40) Viirre E.S., Wing S., Huang R.S, Strychacz C., Koo C., Stripling R., Cohn J., Chase B. and Jung T.P. EEG Markers of Spatial Disorientation. (2006) *Foundations of Augmented Cognition 2nd Ed*. Eds. Schmorow D.D, Stanney K.M. and Reeves L. Falcon Books, San Ramon, California. pp 75-84.
- (41) Tsai Y-F, Viirre E, Strychacz C, Chase B, Jung T-P. Task performance and eye activity: predicting behavior relating to cognitive workload. *Aviat Space Environ Med* (2007); 78(5, Suppl.):B176-B85.
- (42) Robinson SK, Viirre ES, Stein MB. Antidepressant therapy in tinnitus. *Hear. Res.* (2007) Apr;226(1-2):221-31.
- (43) Mackenzie, I, Viirre E., Vanderploeg J. and Chilvers E. "Effects of Zero G and High G in a Patient with Advanced Amyotrophic Lateral Sclerosis." (2007) *The Lancet*, 18;370(9587):566
- (44) Viirre, Erik; Baylis, Françoise; Downie, Jocelyn. "Promises and Perils of Cognitive Performance Tools: A Dialogue." *Technology*. Vol 11, Supplement 1 (2008), pp. 9-25. Cognizant Communications, New York NY.
- (45) Van Orden KF, Viirre E and Kobus, DA. Augmenting Task-Centered Design with Operator State Assessment Technologies. (2007) *HCI 2007, LNAI 4565 in Augmented Cognition D.D. Schmorow, L.M. Reeves (Eds) Springer Verlag Berlin*. pp. 212-219

- (46) Viirre E. Cognitive neuroscience in tinnitus research: a current review. *Int Tinnitus J.* 2007;13(2):110-7.
- (47) Pineda JA, Moore FR and Viirre ES Tinnitus Treatment with Customized Sounds (2008) *Int. Tinnitus J.* Vol 14: p17-25.
- (48) Viirre E. Migraine-related vertigo: a common and important disorder. (2009) *Eur J Neurol* 16(9):966-7.
- (49) Park J Y and Viirre E.S. Vestibular Migraine may be an Important Cause of Dizziness/Vertigo in Perimenopausal Period. *Medical Hypotheses*: accepted (2009)
- (50) Nelson J.A. and Viirre E.S. The Clinical Differentiation of Cerebellar Infarction from Common Vertigo Syndromes. *Western Journal of Emergency Medicine*: accepted (2009)
- (51) Enriquez A., Sklaar J., Erik Viirre E.S. and Chase B. Brief Report: Effects of Caffeine on Postural Stability. *International Tinnitus Journal*: accepted (2009)

BOOK CHAPTERS

- (1) Viirre E. (1995) Health and Safety Issues in Virtual Reality: A Role for Physicians. Proceedings of Medicine Meets Virtual Reality III.
- (2) Viirre E. (1996) Vestibular Telemedicine and Rehabilitation. Applications for VR. Proceedings of Medicine Meets Virtual Reality IV.
- (3) Martens W., McRuer R., Childs T. and Viirre E. (1996) Physiological Approach to Optimal Immersive Game Programming: A Technical Guide. IS&T/SPIE Proceedings 2653: Stereoscopic Displays and Virtual Reality Systems III.
- (4) Viirre, E. S. and Demer, J. L. Head and eye in three dimensions during standing, walking, and running. Three-Dimensional Kinematic Principles of Eye-, Head-, and Limb Movements in Health and Disease. Fetter, M., Misslisch, H., and Tweed, D., Eds. Tübingen: University of Tübingen, 1996, p 217.
- (5) Demer, J. L., Viirre, E. S., and Howard, T. D. Effect of telescopic spectacles on retinal image stability and scan paths during visual search by standing subjects. Vision Science and Its Applications. Vol. 1, 1996, OSA Technical Digest Series. Washington: Optical Society of America, 1996, pp. 82-85.
- (6) Viirre E.S., Pryor H., Nagata S. and Furness T. A. (1998) The Virtual Retinal Display: A New technology for Virtual Reality and Augmented Vision in Medicine. Proceedings of Medicine Meets Virtual Reality VI
- (7) Viirre E.S., Lorant Z., Draper M.H. and Furness T.A. (2001) Virtual Reality and the Vestibular system: a brief review. *Information Technologies in Medicine, Volume II: Rehabilitation and Treatment.* Akay M. and Marsh A. eds. , John Wiley and Sons, New York pp 101-8.
- (8) Viirre E.S. and Bush. D. (2002) Direct Effects of Virtual Environments on Users. Chapter 29. *Handbook of Virtual Environments.* Ed. Stanney K. Lawrence Erlbaum Assoc. New York. pp 581-8.

- (9) Zalewski-Zaragosa R.A. and Viirre E.S. (2002) A Virtual Reality System for Vestibular Rehabilitation. In Proceedings of State of the Science Conference on Telerehabilitation and Applications of Virtual Reality. NRH Press, Washington DC. pp. 79-81
- (10) Viirre E.S. (2003) Bioinspired and Bioderived Materials: Medical Applications in, Materials Research to meet 21st Century Defense Needs. National Research Council, Washington DC. pp 200-206
- (11) Robinson S.K., Viirre E.S. and Stein, M.B. (2004) Antidepressant Therapy for Tinnitus. Chapter 20 Tinnitus Theory and Management, ed. Snow JB. BC Decker, Inc. Hamilton. pp 278-293
- (12) Viirre E.S. (April 14, 2006). Cognitive Systems. In *Wiley Encyclopedia of Biomedical Engineering* (Metin Akay, ed.) Hoboken: John Wiley & Sons, Inc.
[dx.doi.org/10.1002/9780471740360.ebs0281](https://doi.org/10.1002/9780471740360.ebs0281)
- (13) Viirre ES and Nguyen, Q Tinnitus (2007) In: Head and Neck Manifestations of Systemic Disease, Harris JP and Weisman MH (ed.) New York, NY: Informa Healthcare. 2007; pp 379-384.

ABSTRACTS

- (1) Viirre E., Patodia M., Hore J., and Vilis T. (1984) Selective effects of unilateral eye patching on the vestibulo-ocular reflex and saccades. Soc. Neurosci. Abs. 10: 910.
- (2) Viirre E. and Vilis T. (1985) Unilateral patching results in a common uncalibration of the saccadic system and the vestibulo-ocular reflex. Physiologist 28: 329.
- (3) Viirre E., Tweed D., Milner K. and Vilis T. (1985) Dependence of the vestibulo-ocular reflex gain on radius of rotation and target position. Soc. Neurosci. Abs. 11:1037.
- (4) Tweed D., Viirre E., and Vilis T. (1985) A model for target-dependent gain control in the VOR. Soc. Neurosci. Abs. 11:1041.
- (5) Tweed D., Viirre E., and Vilis T. (1986) The oculomotor integrator and internal feedback in three dimensions. Abstract Developments in Oculomotor Research.
- (6) Viirre E., Cadera W. and Vilis T. (1988) Limited monocular adaptation of the vestibulo-ocular reflex and saccades. ARVO Abs. 29: 342.
- (7) Viirre E., Karlik S. and Vilis T. (1988) Extraocular muscle rotation axes: determination in the intact human by magnetic resonance imaging. Soc. Neurosci. Abs.
- (8) Karlik S.J., Cadera W. and Viirre E. (1991) Static and Dynamic MRI Studies of Extraocular Muscles. Abstract of the Society of Magnetic Resonance in Medicine.
- (9) Viirre E., Karlik S., Webber R., and Cadera W. (1994) Imaging of Display of Anatomy

- Movement in Three Dimensions. Abstract of Medicine Meets Virtual Reality II Conference.
- (10) Viirre, E. S. and Demer, J. L. (1995) Effect of target proximity on human vertical vestibulo-ocular reflex (VOR) during combined linear and angular acceleration. Invest. Ophthalmol. Vis. Sci. 36: S685.
- (11) Viirre E. and Demer J. L. (1995) The Vestibulo-Ocular Reflex (VOR) during Horizontal Axis Eccentric Rotation and Near Target Fixation. Conference Abstracts: New Directions in Vestibular Research New York Academy of Sciences.
- (12) Viirre E. and Demer J. (1995) Head and Eye in Three Dimensions During Standing, Walking and Running. Conference Abstracts: Three Dimensional Kinematic Principles of Eye Head and Limb Movements in Health and Disease.
- (13) Crane, B. T., Viirre, E. S., and Demer, J. L. (1995) Effect of target distance and eccentric rotation on human horizontal vestibulo-ocular reflex. Soc. Neurosci. Abstr. 21: 519, 1995.
- (14) Demer J. and Viirre E. (1995) Multi-Dimensional Aspects of Human Eye-Head Coordination During Unrestrained Visual Search Abstracts Optical Society of America.
- (15) Viirre E., Beykirch K. and Baloh R. (1996) Measurements of Head Movements in 6 Degrees of Freedom During Posturography. Abstracts Association for Research in Otolaryngology.
- (16) Martens W., McRuer R., Childs T., Viirre E. and Williamson J. (1996) Physiological Approach to Optimal Immersive Game Programming: A Technical Guide. Abstracts The Society for Imaging Science and Technology and the International Society for Optical Engineering.
- (17) Viirre E. (1996) Virtual Environments: a new technology for vestibular research. J. Vestib. R. 6: S74
- (18) Crane, B.T., Viirre, E.S. and Demer, J.L. (1996) Effect of age on the vestibulo-ocular reflex (VOR) and visual-vestibulo-ocular reflex during natural movements. Soc. Neurosci. Abstr. 22: 1996.
- (19) Demer, J.L., Crane, B.T. and Viirre, E.S. (1996) Rotational and translational head stability during natural movements in young and elderly subjects. Soc. Neurosci. Abstr. 22: 1996
- (20) Viirre E.S., Pryor H.L. and Nagata S. (1997) Laser Safety Analysis of a Scanned Light Display Invest Ophthal Vis Sci 38: S1011.
- (21) Pryor H.L., Nagata S. and Viirre E.S. (1997) Scanned Laser display power and brightness levels compared to a CRT Image Standard Invest Ophthal Vis Sci 38: S1011.
- (22) Nagata S., Pryor H.L. and Viirre E.S. (1997) Visual Image quality of a scanned light display in normal and low vision users. Invest Ophthal Vis Sci 38: S634.
- (23) Draper, M.H., Viirre, E.S., Furness T.F. and Parker D.P. (1997) Theorized Relationship between vestibulo-ocular reflex adaptation and simulator sickness in virtual environments. Proc. Of International Workshop on Motion Sickness: Medical and Human Factors Marabella Spain, p18-21.
- (24) Draper M.H., Prothero J.D. and Viirre E.S. (1997) Physiological adaptations to virtual interfaces: results of initial explorations. Proc. Of 41st Annual Meeting of the Human Factors and Ergonomics Soc.
- (25) Viirre E.S. (1997) Future Technology for Telemedicine: Needs and Capabilities Abstracts, The 3rd International Conference on the Medical Aspects of Telemedicine.
- (26) Viirre E.S. (1998) Adaptation of the VOR in Patients with Low VOR gains. Abstracts: International Barany Society.
- (27) Viirre E.S. (1998) Theoretic Analysis of Adaptation of the Vestibulo-ocular Reflex (VOR) in patients with low VOR gains. Society for Neuroscience, Annual Meeting
- (28) Viirre E.S. (1999) Can Patients with Low VOR Gains Show Improvement with Repeated Visual-Vestibular Interaction? Association for Research in Otolaryngology, Annual Meeting
- (29) Kleweno, C., Seibel, E., Kloeckner, K., Viirre, E., and Furness, T. A. (1999) Evaluation of a scanned laser display as an alternative low vision computer interface. Technical Digest of Vision Science and Its Applications Topical Meeting. February 19-22, Santa Fe, NM.
- (30) Kloeckner, K., Furness, T., Viirre, E., Seibel, E., and Pryor, H. (1999). Design of a prototype low vision aid using a scanned laser display. Technical Digest of Vision Science and Its Applications Topical Meeting. February 19-22, Santa Fe, NM.

- (31) L.Hettinger, J. Cress, M. Haas, T. Nelson, & E. Viirre (1999) Biomechanical sources of information for adaptive interface design 2nd International Congress of Psychophysiology in Ergonomics –Kyoto
- (32) Pineda J.A., Viirre E.S. Vankov A., Hestenes J and Moore. R. (2000) Behavioural and electrophysiological indices of tinnitus exhibit changes with acoustic habituation therapy. Abstracts of the Society for Neuroscience.
- (33) Viirre E.S. (2001) Triological Society, Western Section Meeting
- (34) Viirre E.S. (2001) Incremental Adaptation of the Vestibulo-Ocular Reflex (VOR) in Patients with Chronic Low VOR Gain. Association for Research in Otolaryngology, Annual Meeting
- (35) Draper M.H. and Viirre E.S. (2001) VOR gain adaptation time course during exposure to a head coupled virtual environment. Association for Research in Otolaryngology, Annual Meeting
- (36) Viirre E.S., Kay G.G. and Clark J. (2001) Pharmaceuticals and Nutraceuticals as Countermeasures for Jet Lag. Travel Medicine Society Biannual Meeting
- (37) Shannon K. Robinson, M.D., John R. McQuaid, Ph.D., Erik S. Viirre, M.D., Ph.D., Jeffrey P. Harris, M.D., David L. Miller, Ph.D. & Lynn L. Betzig, M.A. (2002) Reliability of Measures of Tinnitus and their association with Psychological Variables, American Psychosomatic Society.
- (38) Kadner A. Vankov A, Viirre E, Moore FR, Hestenes, J and Pineda J. (2001) EEG Based Diagnostics for Tinnitus Society for Neuroscience, Annual Meeting
- (39) Viirre ES, Baldis J and Baldis S (2001) Intelligent Checklists: Medical Applications NASA Advanced Technology Integration Group, Houston Tx.
- (40) Viirre. E.S. and Miles M. (2002) Migraine Related Vertigo: Quality of Life and Outcomes Assessment Association for Research in Otolaryngology, Annual meeting
- (41) Viirre (2002) Using Virtual Reality for Vertigo Treatment, Lessons Learned. Medicine Meets Virtual Reality, Annual Meeting Abstracts, p 170.
- (42) Viirre E.S. and Zalewski-Zaragosa, R. (2002) Vertigo Matching with Vection Stimuli in Chronic Dizziness Patients. International Barany Society Meeting, Seattle, WA
- (43) Viirre E.S. and Van Orden K (2003) Psychophysiology and Human Computer Interfaces” San Diego Human Factors Society Meeting
- (44) R. Wade Allen, Theodore J. Rosenthal, George Park, Marcia Cook, Dary Fiorentino and Erik Viirre. (2003) Experience with a Low Cost PC Bases System for Young Driver Training. First International Conference on Driver Behavior and Training.
- (45) Viirre E and Van Orden K. (2003) Eye Movements and Operator State DOD Human Factors TAG Meeting 49.
- (46) Viirre E. (2003) “Current Research on Tinnitus and Vertigo. Southern California Conference on Speech, Language and Hearing Sciences. San Diego.
- (47) Viirre E and Van Orden K (2003) Overview of Navy Psychophysiological Monitoring. Workshop:
Cognitive, Psychophysiological and Behavioural Monitoring for Military Field Application
- (48) Viirre E, Van Orden K., Wing S., Chase B., Pribe C., Taliwal V., and Kwak, J. (2004) Eye Movements during Visual and Auditory Task Performance. Society for Information Display, Seattle WA
- (49) Viirre E. Sereno M. (2004) Vection Induced Neural Activity in Insular Cortex International Barany Society Paris, France
- (50) Chase B, Viirre E, Kwak J, Wing S and Van Orden K (2004) Eye Movement Measures of Performance on a Visual Search Task: Equating the Baselines of Task Performance, Society for Human Factors New Orleans
- (51) Park G, Rosenthal T, Allen W, Cook M, Fiorentino D, Viirre E. (2004) Simulator Sickness Results Obtained During a Novice Driver Training Study Society for Human Factors, New Orleans
- (52) Robinson S, Viirre E, Stein M. (2005) Randomized Placebo Controlled Trial of Selective Serotonin Reuptake Inhibitor in the Treatment of Tinnitus Association for Research in Otolaryngology, New Orleans
- (53) Viirre E, Chase B. and Tsai Y-F, (2005) Cognitive performance baseline measurement and eye movement performance measures. SPIE Conference Biomonitoring for Physiological and Cognitive Performance during Military Operations.

- (54) Strychacz, C, Viirre E and Wing, S (2005) The use of EEG to measure cerebral changes during computer-based motion sickness-inducing tasks. SPIE Conference Biomonitoring for Physiological and Cognitive Performance during Military Operations.
- (55) Strychacz C and Viirre E. (2005) Neurophysiologic Detection of Spatial Disorientation States (2005) Aerospace Medicine Association Meeting. Kansas City. Aviation, Space and Environmental Medicine 76: p245, abstract 171
- (56) Viirre E, Epley J and Birck, J. (2006) Investigations of the Orientation of Nystagmus Maxima in Cupulolithiasis Disorders using a Multi Axis Positioning Chair Association for Research in Otolaryngology, Baltimore MD
- (57) Viirre E., Wing S., Huang R-S., Strychacz S., Koo C., Chase B. and Jung T-P. (2006) EEG Markers of Spatial Disorientation, Human Factors Society, San Francisco, CA
- (58) Viirre E (2007) Health Care IT Needs for Human Space Flight. Aerospace Medicine Association Meeting, New Orleans, LA
- (59) Viirre E (2007) Perspectives on Tinnitus Management from Clinical Experience and Research. Second Tinnitus Research Initiative Meeting, Monaco.
- (60) Viirre E. (2007) Advanced Cognitive Science Technology for Tinnitus Research, International Tinnitus Forum, Washington, DC
- (61) Viirre E. (2008) EEG markers of Tinnitus, International Tinnitus Forum, Chicago, IL
- (62) Viirre E. (2009) AOSSM Sports Medicine and the NFL: Disequilibrium and Autonomic Dysfunction in Sports Related Head Injuries
- (63) Viirre E. (2009) Rationale of Customized Sound Therapy, Tinnitus Research Initiative International Meeting, La Stresa, Italy
- (64) Baraca, G Inguanta A, Forti S, Del Bo L and Viirre E, (2009) Customized Sound Therapy for Tinnitus: Clinical Testing. Tinnitus Research Initiative International Meeting, La Stresa, Italy

LECTURES

- 2009: Singularity University: From Disability to Enhanced Cognition 7/09 and adjudicator for project presentations 8/09
HPTE Technology Review, Office of Naval Research, Program Review 1/09
NATO workshop on Remotely operated vehicles
- 2009: Singularity University: From Disability to Enhanced Cognition 7/09 and adjudicator for project presentations 8/09
HPTE Technology Review, Office of Naval Research, Program Review 1/09
NATO workshop on Remotely operated vehicles
American Tinnitus Association: Hope and Help for Living with Tinnitus 5/09
UCSD Neurosciences Grand Rounds: Vestibular Disorders 4/09
UCSF Oto Update Vertigo 2/09
UCSF Oto Update Tinnitus 2/09
- 2008: UCSF Grand Rounds 11/08
University of Ottawa Grand Rounds 10/08
Rady Children's Hospital Department of Otolaryngology 10/08
Vertex Pharmaceuticals, Management of Tinnitus, La Jolla CA
UCSF Oto Update: Current Concepts in Vestibular Disorders 2/18/08
UCSD Department of Cognitive Science, Cog Sci 001
UCSD School of Medicine, Neurosciences Lecture, Vestibular Disorders
UCSD Department of Cognitive Science, Undergraduate Lecture Series
- 2007: Neurology Residents: Diagnosis and Treatment of Vertigo 6/22/07
UCSD Med II Lecture Diagnosis and Treatment of Vertigo 5/3/07
UCSD Surgery Research Seminar: Current Research on Tinnitus and Vertigo 4/07
Cognitive Science Student Assoc. "Tools from Neuroscience for Medicine and Cognition" 4/07
Impact Group, Los Angeles, "Tools for Thinking from Neuroscience" 4/13/07

- UCSD Doctorate of Audiology Lecture: "Pathophysiology of Tinnitus" 3/8/07
- Caltech MIT Entrepreneur Forum: Medical Devices: Tinnitus Otosound Products 1/20/07
- Brain Research Center, National Chiao Tung University, Taiwan
- Neural Markers of Spatial Disorientation 1/4/07
- Neurotechnology Example: Tinnitus Treatment 1/5/07
- From Disability to Enhanced Cognition "Developing Tools for Thinking" 1/6/07
- 2006: IBM "From Disability to Enhanced Cognition: Developing tools for thinking 11/18/06
- NASA Flight Surgeons Johnson Space Center "Neural Markers of Spatial Disorientation" 7/17/06
- UCSD Cognitive Science Department: Perspective from a Clinician-Scientist-Technologist
- San Diego Children's Hospital Otolaryngology: Vertigo in Childhood
- UCSD Medical School Lecture: Vestibular Disorders 5/06
- UCSD Head and Neck Surgery Resident's Lecture
- UCSD Computational Neurobiology Conference
- Potomac Institute Neuroscience Technology Workshop Co-host 6 06
- 2005: Santa Fe Institute: Ethics in Neuroscience Technology
- UCSD Doctorate of Audiology Program: Pathology of Tinnitus
- 2004: UCSD Department of Emergency Medicine: Dizzy Patient in the ER
- 2003: UCSD Department of Family Medicine: Diagnosis and Treatment of Vertigo
- UCSD Division of Head and Neck Surgery: Diagnosis and Treatment of Vertigo
- 2001: UC Berkeley, Engineering, Medical Factors of Long Term Spaceflight.
- 2000: Grand Rounds, UCSD School of Medicine, Department of Internal Medicine
- Lecture: UCSD Department of Bioengineering.
- 1999: Invited lecture: Scripps Hospital Computer Users Group
- Invited lecture: University of California, Berkeley, Department of Engineering Mars Space Mission Design course
- Invited Presentation: Center for Neurologic Study
- Invited Lecture. Association for Computing Machinery, Intelligent Interfaces SIG
- Invited Lecture. Image Society, Annual Meeting, Phoenix Arizona.
- 1998: Invited Lecture: Wright Patterson Air Force Base, Armstrong Laboratory, Dayton, Ohio
- Invited Lecture: Legacy Hospital, Vestibular Laboratory, Portland, Oregon
- Invited Presentation, Association for Computing Machinery, Computer Human Interaction, Annual Meeting, Los, Angeles, California.
- Invited Presentation, Microsoft Corporation, "Accessibility Day", Redmond Washington.
- 1997: Invited Lecture, Department of Neurology, UCSD School of Medicine.
- Invited Lecture "IEEE, Section on Biology and Medicine" Annual Meeting, Chicago, Ill.
- Invited Lecture: "The Balance Center, A Center of Excellence" Orlando, Florida
- Invited Lecture, Department of Engineering, University of Washington, Seattle.
- Invited Lecture Dept of Engineering, University of California, Berkeley
- Invited Lecture: ENT Dept, Tripler Army Medical Center, Honolulu HI
- Invited Lecture: ENT Dept, Cleveland Clinic, Cleveland OH.
- Invited Lecture Medicine Meets Virtual Reality V, San Diego CA
- 1996: Invited Lecture: Univ. Washington, Science in Ophthalmology Rounds
- Invited Lecture: Dept of Ophthalmology Grand Rounds, Univ. Washington
- Invited Lectures: 16th Annual Army Neurology Conference, Tacoma, WA
- Invited Lecture: Centennial Meeting of the American Academy of Ophthalmology.
- Invited Lecture: Plenary session of 31st International Barany Society, Sydney Australia.
- Invited Lecture: Medicine Meets Virtual Reality IV, San Diego Ca.,
- Invited Lecture Hughes Research, Malibu, California.
- Invited Lecture Dow Neurosciences Unit, Portland Oregon.
- 1995: Invited Lecture Medicine meets Virtual Reality III, San Diego Ca. ,Invited Lecture Department of Otolaryngology, University of California, San Diego. Invited Lecture U. Washington, Neurology Department.

- 1994: Invited Lecture at Virtual reality Expo, San Jose Ca. Invited Lecture Medicine meets Virtual Reality II, San Diego Ca. Invited Lecture and Workshop Host, Virtual Reality Expo, New York.
- 1993: Invited Lecture at Virtual Reality Expo, New York City, NY.
- 1992: Invited lecture at Department of Computer Science, U. North Carolina, Chapel Hill.
- 1991: Invited Lecture at University of Washington, Seattle, Department of Ophthalmology. Invited Lecture at International Space University, 1991 session, Toulouse, France.
- 1989: Invited lecture at CNRS, Universite de Paris.
- 1988: Invited lecture at National Institutes of Health. Invited lecture at NASA Ames Research Center. Invited Lecture at University of California, Berkeley Department of Optometry. Invited Lecture at Stanford University, Ophthalmology Department. Invited Lecture Massachusetts Institute of Technology, Manned Vehicle Laboratory.
- 1987: Ph.D. Public Lecture at the University of Western Ontario. Invited Lecture at Smith-Kettlewell Institute for Visual Sciences.

INTELLECTUAL PROPERTY

- (1) Patent Dec 21, 1999 US 6003991 "Eye Examination apparatus and method for remote examination by a health professional"
- (2) Patent July 25, 2006 US #7,081,085 "EEG feedback controlled sound therapy for tinnitus"
- (3) Patent Aug 11, 2009 U.S. #7572234 Viirre et. al. EEG feedback controlled sound therapy for tinnitus

PUBLICATIONS AND INTERVIEWS FOR THE GENERAL PRESS

- 1) Viirre E. A Survey of Medical Issues and Virtual Reality Technology Virtual Reality World (July/August 1994).
- 2) Viirre E. Human Interface Technology Laboratory Vision Research HIT Lab Review #8(Fall, Winter 1996).
- 3.) The Economist, February 10, 2001. Curing Vertigo with Virtual Reality
- 4.) Description of patient treatment for vertigo with Virtual Reality technology in book "Virtual Healing" by Weiderhold B.K. (2004) Interactive Media Institute, San Diego. Pages 109-113.
- 5.) IBM Internal Journal "Hero Spot" 11/06 Tools for thinking: Harnessing the power of the mind
- 6.) New York Times "The Route from Research to Start-up" (January, 2007)
- 7.) San Diego Union Tribune, KPBS Radio, La Jolla Light, Orillia Packet and Times (June, 2007)
- 8.) Profile as "Meet a Test User" in Psychological Testing and Assessment, 7th Ed. Editor Ron Cohen, McGraw Hill Publishing.
- 9.) Report UCSD Press Release and La Jolla Light on participation on "Nick News" flight with paraplegic children in parabolic flights for weightlessness.

LEARNED SOCIETIES

Association for Research in Vision and Ophthalmology.
Society for Neuroscience.
Association for Research In Otolaryngology
Aerospace Medicine Association

PROFESSIONAL QUALIFICATIONS

Medical License: College of Physicians and Surgeons, Province of Ontario
Medical License: Medical Board of California

PROFESSIONAL and CHARITABLE ACTIVITIES

Board of San Diego Air and Space Museum 2006-present
Organizer Astronaut Nicholas Patrick to San Diego, AIAA and San Diego Schools, 2007

Team America Rocket Challenge Sponsor 2007
Member Siggraph Sigkids Conference Committee, San Diego 2003
X-Prize Volunteer, 2002-3
Member, Editorial Board, Journal "International Tinnitus Journal" 2007
Member, Editorial Board, Journal "Cyberpsychology and Behavior" 1998- present
Member, Board of Directors, Institute for Interventional Informatics (I³) 1996-7
Director, Committee for Scientific Research, Dream a Dolphin Foundation 1996-8
Program Committee Member, Medicine Meets Virtual Reality Conferences 1996-8
Member, Editorial Board, Journal "Presence" 1996
Organizer, Technology Session of "3rd International Conference on the Medical Aspects of Telemedicine". 1996

PERSONAL QUALIFICATIONS

NAUI Certified Scuba Diver	Log 30
Dives	
Canadian Ministry of Transport Private Pilot: Land, Sea, Night, Instrument.	350
Hours	
Weightlessness	70
Parabolas	
Parachutist	Training, 1
jump	
Canadian Yachting Association Blue Instructor	
High School Team Cross-Country Skiing	

2. I have read the Official Action mailed December 6, 2010, and I have reviewed the pending claims and the present application. It appears that the Examiner in the Official Action does not appreciate the unexpected superior results obtained with the claimed medical examination chair (commercially called "TRV chair"), which has been tested and exploited to enable a practitioner to treat positional vertigo.

3. At present, many French Medical Universities (Paris, Strasbourg, Lyon, Toulouse, etc) are equipped with the TRV chair, and have obtained unforeseen positive results using the chair. Outside France (FR), more than 12 TRV chairs are currently

successfully in use, e.g. in China (CN - EENT Hospital Shangai), Norway (NO - Bergen), Austria (AT - Innsbruck). The TRV chair is ready to be imported to the United States for testing related to FDA approval.

4. The claimed medical examination chair is, at present, mostly used for:

Examination and treatment of the condition, benign positional vertigo (BPV). Both the diagnostic maneuvers, such as the Dix-Hallpike test for posterior and anterior semi-circular canal BPV and therapeutic maneuvers, such as the canalith repositioning maneuver (CRM) are carried out with the TRV chair. Further, such maneuvers such as horizontal canal positioning and the "barbeque spit" rotation for horizontal semi-circular canal BPV are carried out with the TRV. Importantly, the "C" arm design of the chair enables the examiner to stand directly beside the patient. This gives several critical affordances: direct control of the speed (fast or slow) of any given therapeutic maneuvers, direct contact with the patient to allay their anxious provoked by these actions and the ability to manually apply low-level vibration to the mastoid which facilitates the repositioning of the offending canaliths which are the cause of this disease.

5. Comparison to the Prior Art:

a) COLES US Pat. No. 4,402,500 describes an amusement apparatus, also with a fixed frame having a U shape on which are mounted closed circular shaped rings. This apparatus offers a limited access from the outside to the person seated in, and doesn't provide precisely adjustable rotation stoppers which are able to provoke pre-determined shocks to a patient. With the '500 apparatus, the movement is random, i.e. uncontrolled, and it is therefore impossible to precisely locate the person in the '500 apparatus with their ear canals in a geometrical plane thereby allowing for crystal particles as small as 30µm can be ejected out of this canal. This document doesn't shows restraining means as per those in the claims.

The braking mechanism in the Coles reference allows for occupant control of the speed of the rotation or spinning, which would not be available for a person using a medical device, as the rotational speed would be closely controlled by medical personnel. The brake in the '500 patent is a disc and shoe frictional brake which slows the rotational motion, as shown by brake disc 37, brake shoe 38 and adjustment screw 40 to slow the spinning of the ring 15, or by brake disc 45, calipers 48 and handgrip 47 to slow the spinning of the cage 23. The brake in the present invention is an abutment, which abruptly stops the rotation at a predetermined location. Additionally, the '500 device allows for rotation in 360 degrees of motion through both

the horizontal and vertical rotational axes, while the present invention limits the rotation of the person, e.g. through 180 degrees.

b) CHINOMI US Pat. No. 5,052,754 doesn't shows restraining means as per those in the claims as it does not teach a headband restraint. This document has no relation with the invention, since it describes headrest arrangement in which the headrest is driven by driving motors installed in a seat of an automotive vehicle.

Additionally, it would be nonobvious to add a headrest as taught by Chinomi with the addition of a headband restraint to the device of Coles because the user would not be able to use their body to move the device of Coles, thereby rendering Coles unsatisfactory for its intended purpose.

c) ALTON US Pat. No. 5,792,031 teaches shoulder straps, to secure the shoulders of a standing person in a simulation system for simulating a human activity. Unlike the claimed examination chair, the simulation system of ALTON is a huge and bulky device, which cannot be used in a Hospital or a Practitioner's office. Besides, unlike the claimed examination chair, the simulation system of ALTON is offering a high and difficult access to the "ski support" for the person willing to simulate activities. Such a simulation system of ALTON is totally

improper for access by a handicapped, or overweight or sick Patient. Such a Patient has to be seated, and cannot stand in an upright position, as proposed by ALTON US Pat. No. 5,792,031.

Unlike the claimed examination chair, the simulation system of ALTON is useful in simulating activities such as skiing, surfing and other sports as well as basic body movements for rehabilitation purposes. Unlike the claimed examination chair, the simulation system of ALTON is supporting the individual in a harness and moving his body relative to the harness. The only mention of a "patient" is relating to the title of a prior brief "NASA Technical Brief No. GSC-13348".

Additionally, it would be nonobvious to add shoulder restraints as taught by Alton to the device of Coles because the user would not be able to use their body as taught by Coles to move the device, thereby rendering Coles unsatisfactory for its intended purpose.

6. Advantages over the prior art

Unlike these cited documents (Coles, Chinomi, and Alton), the claimed invention aims to enhance the diagnosis and treatment of benign positional vertigo, as exposed in the document XP 008016037 (Furman & al. "Treatment of benign positional vertigo using heels-over-head rotation").

The numerous advantages provided by the claimed medical examination chair include providing brake means for precisely and

suddenly stopping the rotary movement chosen and provoked by the Practitioner as claimed by the mechanical abutments. The prior art as cited does not include a braking mechanism to accomplish the sudden stop required for treatment, which is very important to cure benign positional vertigo. The invention has been used now for a few years by specialized Doctors in Medicine, with amazing results: only one single predetermined shock is sufficient to release the Patient from his benign positional vertigo most of the time.

To obtain such unequalled results, on the one hand, the precise direction / orientation of the shock has to be predetermined by the doctor, and be strictly translated by the chair (by adjustments of the end of motion stoppers).

On the other hand, the motion must be precisely operated (e.g. manually most of the time) and controlled (e.g. camera for following eye movements).

This predetermined shock is mainly based upon the three dimensional orientation of the inner ear of the Patient, where an otolith is present.

Furthermore, unlike EPLEY US Pat. No. 6,800,062 for instance, perfect results can be obtained when the motion applied to the Patient is manual and provoked by hand (no motors) by the Doctor. Even when the motion is manual, it is very helpful to

have a camera control of the position of the Patient's eyes during the motions.

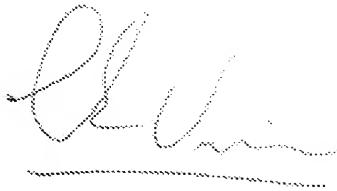
This also can help the predetermining of the motions orientations, amplitude and end location.

The references cited in the Official Action fail to suggest the superior and unexpected results of the claimed invention, as evidenced above by the examples of the effectiveness of treatment showing both statistical and practical significance.

7. Thus, based on the teachings of the cited references there is no suggestion that the prior art devices of record would be capable of providing claimed medical examination chair (commercially called "TRV chair"), able to enable a Practitioner to treat positional vertigo.

The undersigned declare further that all statements made herein of their own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under §1001 of Title 18 of the United States Code and that such willful false

statements may jeopardize the validity of the application or any
patent issuing thereon.

A handwritten signature in cursive script, appearing to read 'E. Viirre', written in dark ink on a light background.

Erik S Viirre M.D. Ph.D

March 1, 2011

Date